Question 1

Summary:

- Generated a Set of Packets in the same subnet as in the Input IP, neglecting the Network and the Broadcast address.
- Rejected if the entered IP is Network/Broadcast address
- Using IP(dst = ipaddress) and TCL(dport = [80,53]) for each IP in the set

Input:

• Format accepted as input is "Ipaddress/Netmask" - (10.10.111.2/24)

Explanation:

- Used Scapy, Netaddr and Regular Expression Library
- Used Regular Expression Library to validate the input given in the correct format and extracting ip from subnet
- Netaddr Library to calculate the Network and Broadcast address based on the Subnet provided
- Scapy used to generate the packets with the
 - o IP Layer with Destination IP
 - o TCP Layer with Destination Ports [80, 53] as given in the question
- As there are 2 ports given in the question, for each ip, 2 packets with 2 port numbers are generated
- Filtered the IPs in the Set Generated by Scapy for the Network and Broadcast address. Used the filtered list to generate packet sets for each port. Reference to the output below
- Code is properly commented at each step

Output Samples:



Question 2

Summary:

• Generated an ICMP request to a target and showed the response received and packet generated

Input:

Format accepted as input is "Ipaddress/Netmask" - (10.10.111.2/24)

Explanation:

- Similar to the Code in Q1 used the same libraries, validated and extracted the input ip
- Using Scapy generated a packet with
 - IP Layer having destination IP
 - o ICMP Layer having type ICMP Request
- Created a Send/Receive handle with "sr1" (Receive answer) function of scapy and received the response
- Displayed both the Packets generated and response received with summary and show.

```
import sys
from scapy.all import * # Scapy Library - Packet Generation and Receiving
import re
from netaddr import *
if ext:
```

```
sys.exit()
else:
    print "You have entered IP of network: %s and netmask: %s" %
    (ix.network,ix.netmask)

# ICMP Packet Handles
# Contructing ICMP Packet to Send

#print "===> An ICMP Request Packet Paramaters are..."
#ls(ICMP)
# Constructing the ICMP Packet with the destination IP Layer

# Constructing the ICMP Packet with the Dentination IP Layer and ICMP Type
Request
print "The Entered IP is %s - Performing ICMP Request..." % (ip)
icmp_req = IP(dst = ip)/ICMP(type = "echo-request")
print "-----> The ICMP Request look like this...."
print icmp_req.summary()
print icmp_res.show()

# Scapy Sender/Receiver Call to obtain the Answer for the request made
icmp_res = sr1(icmp_req,verbose=0)
print "-----> The ICMP Response look like this...."
print icmp_res.summary()
print icmp_res.summary()
print icmp_res.show()
```

Output Samples:





Question 3

Summary:

Answer worked out in 2 parts:

Part 1: Host and Port Identification

- Performed TCP Traceroute with generation of TCP SYN and analysed the output to be SYN/ACK or RST/ACK to interpret if the port in the host are open or close
- Started with Time to Live to be 1 and incremented based on the ICMP host unreachable received
- Assumptions made:
 - Hop Count: assumed to be maximum 16 based on the limit by most of the routing protocols
 - o Ports: Queried to all the reserved ports from 1 -> 10; Can be Altered in the code

Part 2: Host Only Identification:

- Performed TCP Traceroute with the Generation of TCP SYN (Without any destination port consideration)
- Created a Bunch of packets with IP Layer having Dest IP and TTL range from (1 to 16)
 - o TCP of the packet only set with the SYN flag

Input:

Format accepted as input is "Ipaddress/Netmask" - (10.10.111.2/24)

Explanation:

Part1:

- Similar to the Code in Q1 used the same libraries, validated and extracted the input ip
- Using Scapy generated a packet with
 - o IP Layer having destination IP and TTL
 - o TCP Layer having the SYN flag and Destination Port
- Created a Send/Receive handle with "sr1" function of scapy and received the response with verbose "0" to prevent any print by scapy and timeout to 3 to prevent any delay
- Based on SYN/ACK and RST/ACK received segregated the port as Open or Close
- Displayed the output in format "Port Status (Open/Close) RoundTripTime Packet Summary"
- If an ICMP response Host Unreachable is received the TTL is incremented and the tcp traceroute tries again with incremented TTL
- Once the TTL reaches 16 it exits the program

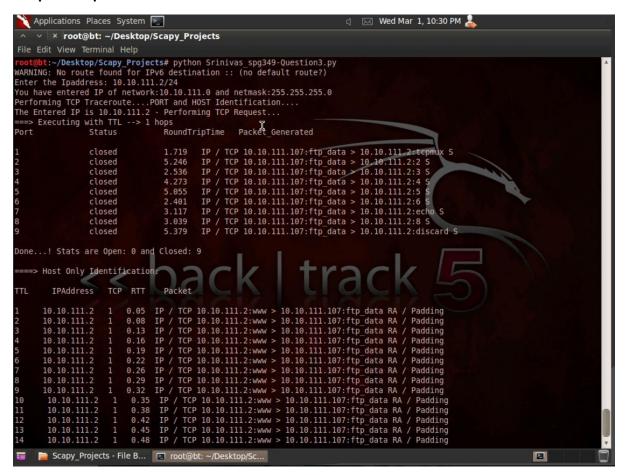
Part2:

- Validated and obtained the IP from the input
- Constructed a Bunch of packets
 - IP layer having
 - Destination IP = Input IP
 - TTL Ranging between any value desired (Used 1-16 in code)
 - o TCP Layer
 - Having the SYN bit set
- Used the Send/Receive Handle "sr" to obtain all the packets irrelevant of the answer
- Based on the Received packets used "haslayer" [TCP Layer Existence Maybe RST/ACK or SYN/ACK both
 determine host present], Just checking for the existence of the tcp layer to validate the host presence and
 output is displayed with the "TTL IP TCP RoundTripTime Packet Summary". Output below

```
if ext:
 break
```

```
a.time))[:4],str(b.summary()))
```

Output Samples:



Question 4 – SYN Flood Attack

Summary:

- The Command line argument is created with the IP input and Optional Port Input If Port is not given, 139 is taken as default as mentioned in the question
- Using Scapy, Packets are constructed with
 - o IP Layer with Target IP
 - TCP Layer with Various SourcePort (1->1024), SYN Flag, Same Destination Port (As given in Input)
- Probed the host with various source Ports with SYN Flag against the same NETBIOS Port of Windows
 Machine
- Analysed the response and displayed whether SYN/ACK or RST/ACK was received with the port and packet summary

Input:

• Format accepted as input is "Ipaddress/Netmask" - (10.10.111.2/24)

Explanation:

- Used Scapy, Sys Library
- Handles the Command Line Arguments with

- IP Input Mandatory
- o Port Input Optional (Default Port is 139)
- Used Regular Expression Library to validate the input given in the correct format and extracting ip from subnet
- Scapy used to generate the packets for FLOOD with the
 - o IP Layer with Destination IP
 - o TCP Layer with Various (1024) Source Ports, Same Destination Port (139) and SYN Flag
- Source Port Count can be altered based on the flood created
- Analysed the response and displayed the "SrcPort DstPort Response Packet Summary"
- Code is properly commented at each step

```
# IP Address and Custom Port Handle
elif len(sys.argv) > 2 and len(sys.argv) < 4:
if ext:
```

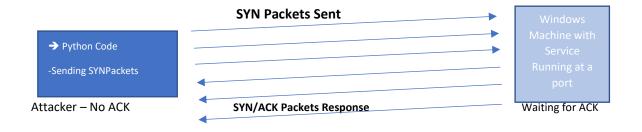
```
except:
    stat = "None"
print "Src_Port:%d \t Dst_Port:%s \t Response:%s %s" % (i,port,stat,str(syn.summary()))
```

======= Explanation - SYN Flood:

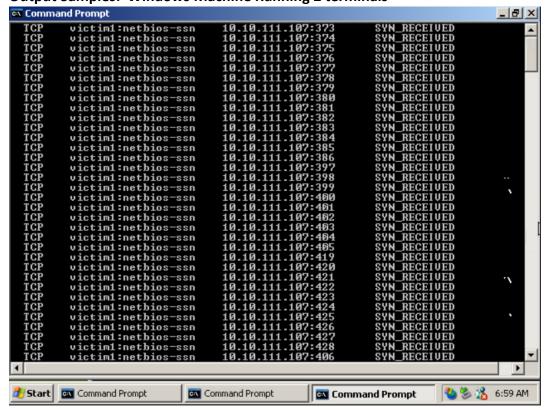
 The Code generates series of TCP SYN Packets with various source ports and does not complete the TCP Connection even after the SYN/ACK is received

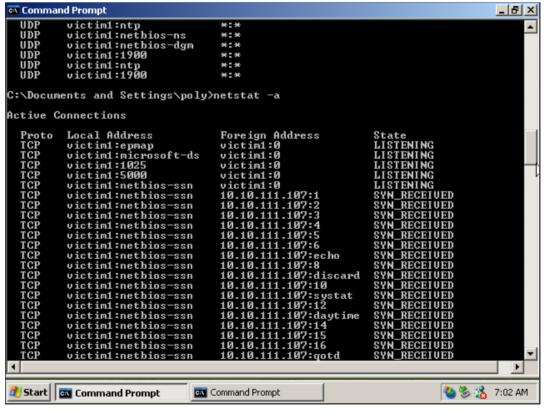
- Resulting in Half Open TCP Connections

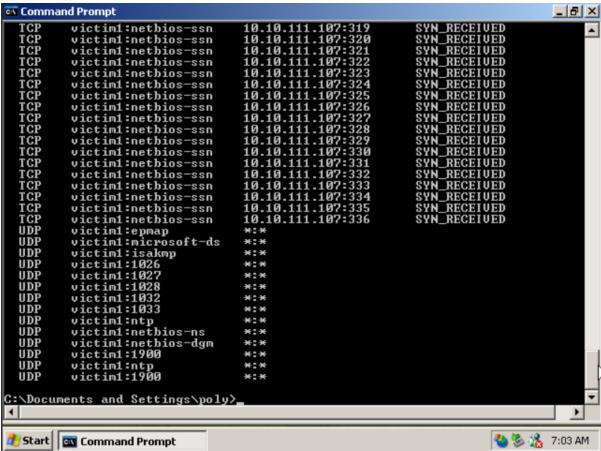
- Continuously making Half Open TCP Connection consumes numerous resources at the Server Machine
 (As each of the Open TCP Half Connection Allocate some resource and wait for the final TCP ACK to
 complete the connection)
- The TCP ACK is never sent by the client (Our Code) and hence at the server numerous stagnant half connections get piled up resulting in the Service crash down and affecting the AVAILABILITY of the Server

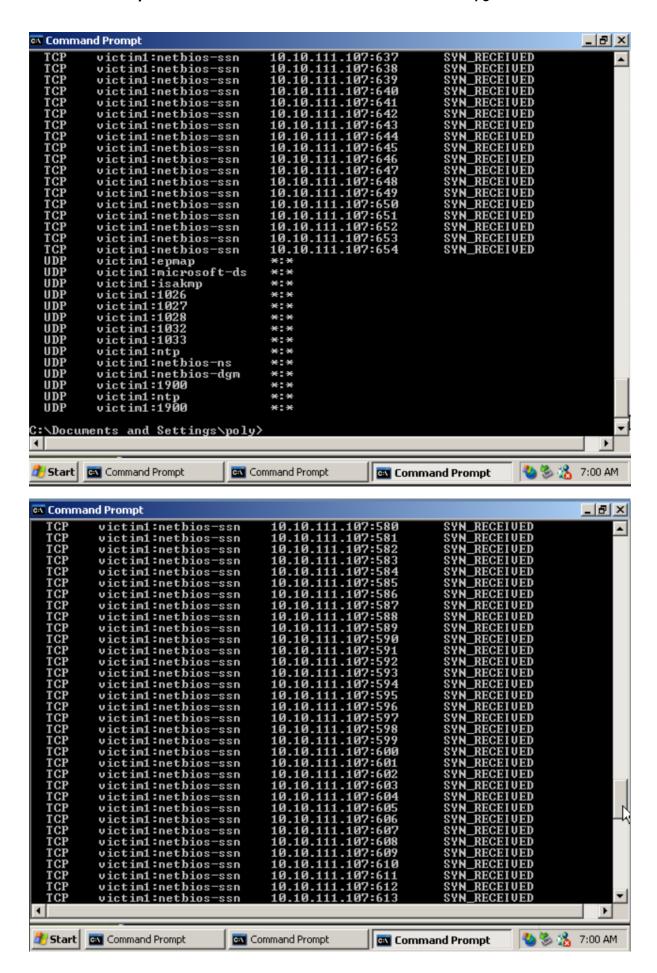


Output Samples: Windows Machine Running 2 terminals









Script Output:

